IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

U.S.Patent
Application of: Y. Okubo et al.
Serial Number : 10/558,363
Filed : November 25, 2005
For : TRANSPARENT FILM FOR DISPLAY SUBSTRATE, DISPLAY SUBSTRATE USING THE FILM AND MANUFACTURING METHOD THEREOF; CRYSTAL DISPLAY, ORGANIC ELECTROLUMINESCENCE DISPLAY AND TOUCH PANEL
Group Art Unit: 1794
Examiner : Sow-Fun Hon

DECLARATION UNDER 37 C.F.R. 1.132

Commissioner for Patents
P.O. Box 1450
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Sir:

I, YASUSHI OKUBO, hereby declare and say as follows:

That I am a post graduate from Kyoto University having been awarded a Masters Degree in Polymer Science in March 1999.

That since April, I have been employed by Konica Corporation (present Konica Minolta Technology Center, Inc.), the owner of the above-identified application. During my employment, I have been engaged in the research and the study of optical materials in the Research and Development Laboratory of my company.

That I am a co-inventor of the present application.

That I am familiar with the subject matter of the present invention.

What follows is an accurate summary of experiments conducted according to my detailed instructions and under my personal supervision, and the results obtained therefrom.

Comparative test

1. Yamada discloses a cellulose ester film drawn at one stretch ratio of 6 percent (by a factor of 1.06, [0111]) in a lateral direction, but does not disclose any specific stretch range.

Machell, which is cited for disclosing the biaxial stretch of the cellulose ester film, discloses the cellulose ester film biaxially stretched by a stretch ratio in the range of 25 through 125 percent, and preferably 50 through 100 percent in both directions (in both the lateral direction and the conveyance direction, column 10, lines 5-17). Apparently, the one stretch ratio value (6 percent) of Yamada falls outside the stretch ratio range (25 through 125 percent or 50 through 100 percent) of Machell. That is, the stretch ratio range of Machell does not cover even the one stretch ratio value of Yamada. Further, none of the cited references disclose that the display substrate as claimed exhibits the unexpected result of improving moisture permeability after thermal shock. It is difficult to arrive at the subject matter of the invention by combining Yamada, which does not disclose any stretch ratio range, with Machell, disclosing the stretch ratio range not covering the stretch ratio of Yamada.

2. In order to further show the unexpected results of the invention, additional comparative test was carried out, in which the invention was compared with the closest prior art. The comparative test was carried out based on Film Substrate 25 in Example 4 of Yamada, which is a preferred embodiment of Yamada and to which the Examiner refers on

page 3, lines 8-11 of the first Office Action dated July 24, 2009, where the Examiner states, "Yamada teaches that the transparent film is drawn 6 percent (factor of 1.06, [0110]) in a lateral direction (transverse, [0110], which is within the claimed range of 3 through 100 percent." Film Substrate 25 itself of Yamada does not have a moisture proof film nor a transparent conductive film, and therefore, the Film Substrate 25 further provided with a moisture proof film and a transparent conductive film was employed as the closest prior art to be compared with the invention.

Preparation of Substrate C (comparative)

A transparent film, drawn by a factor of 1.06 in the lateral (transverse) direction, was prepared in the same manner as in Film Substrate 25 in Example 4 of Yamada. Thus, Substrate C was prepared.

Preparation of Substrate C-1 (comparative)

A transparent film, drawn by a factor of 1.06 in the lateral (transverse) direction, was prepared in the same manner as in Film Substrate 25 in Example 4 of Yamada. The transparent film was subjected to the atmospheric plasma processing for forming a moisture proof film in the same manner as in EMBODIMENT 2 of the present Specification, to form a silicon oxide film having a film thickness of 180 nm as the moisture proof film. Subsequently, the resulting film was further subjected to the atmospheric plasma processing for forming a transparent conductive film in the same manner as in EMBODIMENT 2 of the present Specification, to form a tin-doped indium oxide film (ITO film) having a thickness of 110 nm as the transparent conductive film on the silicon oxide layer. Thus, Substrate C-1 (Comparative) was prepared.

Preparation of Substrate C-2 (comparative)

Substrate C-2 (Comparative) was prepared in the same manner as in Substrate C-1 above, except that the

transparent film was drawn by a factor of 1.35 in the lateral (transverse) direction.

Preparation of Substrate C-3 (comparative)

Substrate C-3 (Comparative) was prepared in the same manner as in Substrate C-1 above, except that the transparent film was drawn by a factor of 2.00 in the lateral (transverse) direction.

Preparation of Substrate I-1 (Inventive)

Substrate I-1 (Inventive) was prepared in the same manner as in Substrate C-1 above, except that the transparent film was further drawn by a factor of 1.06 in the conveyance direction.

Preparation of Substrate I-2 (Inventive)

Substrate I-2 (Inventive) was prepared in the same manner as in Substrate C-2 above, except that the transparent film was further drawn by a factor of 1.35 in the conveyance direction.

Preparation of Substrate I-3 (Inventive)

Substrate I-3 (Inventive) was prepared in the same manner as in Substrate C-3 above, except that the transparent film was further drawn by a factor of 2.00 in the conveyance direction.

The substrates prepared above were evaluated for moisture permeability (before thermal shock cycle) and moisture permeability after thermal shock cycle in the same manner as in EMBODIMENT 2 of the present Specification.

The results are shown in Table 3.

Table 3

Substrate No.	*1	*2	Remarks
C	95	480	Comparative
C-1	0.55	2.74	Comparative
C-2	0.55	2.72	Comparative
C-3	0.58	2.81	Comparative
I-1	0.54	1.01	Inventive
I-2	0.54	0.99	Inventive
I-3	0.56	1.10	Inventive

*1: Moisture permeability (before thermal shock) ($g/m^2/d$)
*2: Moisture permeability (after thermal shock) ($g/m^2/d$)
"$g/m^2/d$" represents moisture permeation rate per day.

As is apparent from Table 3, both the inventive substrates I-1 through I-3 and comparative substrates C-1 through C-3 are extremely low in moisture permeability as compared with Comparative Substrate C, Film Substrate 25 itself of Yamada, and moisture permeability (before thermal shock) of inventive Substrates I-1 through I-3 is substantially the same as that of comparative Substrates C-1 through C-3, however, moisture permeability after thermal shock of inventive Substrates I-1 through I-3 are about three times lower than that of comparative Substrates C-1 through C-3, the inventive Substrates I-1 through I-3 greatly improving moisture permeability after thermal shock. The result is unexpected to one of ordinary skill in the art, and it would not have been obvious to one of ordinary skill in the art at the time of the invention to combine Yamada, which does not disclose any stretch ratio range, with Machell, disclosing the stretch ratio range not covering even the stretch ratio value of Yamada, and to arrive at the subject matter of the invention with an expectation of obtaining the unexpected result of improving moisture permeability after thermal shock. Accordingly, I believe that instant claim 12, and all the claims, which depend therefrom, are in a situation of allowability.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001, of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated: March, 17, 2010

Yasushi Okubo
YASUSHI OKUBO